

REMARKS

Claims 20-28 are now pending in the application. Claims 20-28 stand rejected. Claims 20 and 24-27 are amended. Support for the amendments can be found in the originally filed specification at paragraphs [0034] and [0044]. The Examiner is respectfully requested to reconsider and withdraw the rejections in view of the amendments and remarks contained herein.

REJECTION UNDER 35 U.S.C. § 112

Claims 24-27 stand rejected under 35 U.S.C. § 112, first paragraph, as failing to comply with the written description requirement. This rejection is respectfully traversed.

The Examiner states that there is no support in Applicants' disclosure for the maximum tool pitch being no more than twenty percent of average spot size, or no more than thirty percent of average spot size, or no more than forty percent of average spot size, or less than fifty percent of average spot size. However, paragraph [0034] of Applicant's disclosure states that a tool pitch of 2 microns can be employed with a spot size of 10 microns. But Applicants have amended claims 24-27 to remove the word "maximum." Therefore, it should be accurate to claim the embodiments in which the tool pitch is less than fifty percent of the spot size, as well as the embodiments in which the tool pitch is no more than twenty percent of the average spot size, and similar embodiments.

Accordingly, Applicants respectfully request the Examiner reconsider and withdraw the rejection of claims 24-27 under 35 U.S.C. § 112, first paragraph.

REJECTION UNDER 35 U.S.C. § 102

Claims 20-23 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Aoki et al. (U.S. Pat. No. 5,237,148). This rejection is respectfully traversed.

The teachings of Aoki et al. are generally directed toward laser milling manufacture of a nozzle. In particular, the Examiner relies on Aoki et al. to teach a “constant arc speed” in the form of a laser that, as best understood by Applicants, is moved along a z-axis either up (away from the workpiece) or down (toward the workpiece) at a rate controlled according to the distance along the z-axis. Although the Examiner appears to admit that the process of laser milling the workpiece is not taught by Aoki et al., The Examiner argues that the claims are all product by process claims, that Aoki et al.’s inkjet nozzle is the same as Applicants’, and that the process of manufacture does not effectively limit the claims. However, Aoki et al. do not teach a laser-milled workpiece comprising a workpiece layer having an aperture formed therein via laser ablation of workpiece material, wherein a diameter of said aperture has an accuracy of 20 micrometers \pm 1.5 micrometers.

Applicants’ claimed invention is generally directed toward a workpiece milled according to a constant tool path algorithm. In particular, Applicants’ claimed invention is directed toward a workpiece layer having an aperture formed therein via laser ablation of workpiece material, wherein a diameter of said aperture has an accuracy of 20 micrometers \pm 1.5 micrometers. For example, independent claim 20, especially as amended, recites, “A laser-milled workpiece comprising a workpiece layer having an aperture formed therein via laser ablation of workpiece material, wherein a diameter of said aperture has an accuracy of 20 micrometers \pm 1.5 micrometers.” Support for the

amendment can be found in the originally filed specification at paragraph [0044]. Therefore, the Claims are not product by process claims. Alternatively or additionally, the claimed product workpiece is not the same as the ink jet nozzle of Aoki et al.

Accordingly, Applicants respectfully request that the Examiner withdraw the rejection of independent claim 20 under 35 U.S.C. §102(b), along with rejection on these grounds of all claims dependent therefrom.

REJECTION UNDER 35 U.S.C. § 103

Claims 20-23 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Temple et al. (U.S. Pat. No. 6,228,311) in view of Zanomi (U.S. Pat. No. 3,961,838). This rejection is respectfully traversed.

The teachings of Temple et al. are generally directed toward forming nozzles by laser milling. In particular, the Examiner relies on Temple et al. to teach laser ablation of a workpiece according to a toolpath. However, Temple et al. do not teach, suggest, or motivate a laser-milled workpiece comprising a workpiece layer having an aperture formed therein via laser ablation of workpiece material, wherein a diameter of said aperture has an accuracy of 20 micrometers \pm 1.5 micrometers.

The teachings of Zanomi are generally directed toward producing a scanning laser beam of constant linear velocity. In particular, the Examiner relies on Zanomi to teach a tool path having constant or uniform angular velocity. However, Zanomi does not teach, suggest, or motivate a laser-milled workpiece comprising a workpiece layer having an aperture formed therein via laser ablation of workpiece material, wherein a diameter of said aperture has an accuracy of 20 micrometers \pm 1.5 micrometers.

Applicants' claimed invention is generally directed toward a laser milled workpiece. In particular, Applicants' claimed invention is directed toward a workpiece layer having an aperture formed therein via laser ablation of workpiece material, wherein a diameter of said aperture has an accuracy of 20 micrometers \pm 1.5 micrometers. For example, independent claim 20, especially as amended, recites, "A laser-milled workpiece comprising a workpiece layer having an aperture formed therein via laser ablation of workpiece material, wherein a diameter of said aperture has an accuracy of 20 micrometers \pm 1.5 micrometers." Support for the amendment can be found in the originally filed specification at paragraph [0044]. Therefore, Temple et al. and Zanomi do not teach, suggest, or motivate all of the limitations of the independent claim.

Accordingly, Applicants respectfully request that the Examiner withdraw the rejection of independent claim 20 under 35 U.S.C. §103(a), along with rejection on these grounds of all claims dependent therefrom.

Claims 24-28 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Aoki et al. (U.S. Pat. No. 5,237,148) in view of Liu et al. (U.S. Pat. No. 6,433, 305).

For discussion of significant difference between Applicants' claimed invention and the teachings of Aoki et al., Applicants respectfully direct the Examiner's attention to remarks detailed above with respect to rejection under 35 U.S.C. § 102.

The Examiner relies on Liu et al. to teach drilling holes in a workpiece with an ultrafast laser at a pitch less than 50% of spot size. However, Liu et al. do not teach, suggest, or motivate a laser-milled workpiece comprising a workpiece layer having an

aperture formed therein via laser ablation of workpiece material, wherein a diameter of said aperture has an accuracy of 20 micrometers \pm 1.5 micrometers.

Applicants' claimed invention is generally directed toward a laser milled workpiece. In particular, Applicants' claimed invention is directed toward a workpiece layer having an aperture formed therein via laser ablation of workpiece material, wherein a diameter of said aperture has an accuracy of 20 micrometers \pm 1.5 micrometers. For example, independent claim 20, especially as amended, recites, "A laser-milled workpiece comprising a workpiece layer having an aperture formed therein via laser ablation of workpiece material, wherein a diameter of said aperture has an accuracy of 20 micrometers \pm 1.5 micrometers." Support for the amendment can be found in the originally filed specification at paragraph [0044]. Therefore, Aoki et al. and Liu et al. do not teach, suggest, or motivate all of the limitations of the independent claim.

Accordingly, Applicants respectfully request that the Examiner withdraw the rejection of independent claims 24-28 under 35 U.S.C. §103(a) in view of their dependence from an allowable base claim.

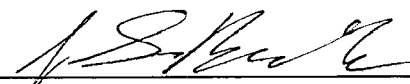
CONCLUSION

It is believed that all of the stated grounds of rejection have been properly traversed, accommodated, or rendered moot. Applicant therefore respectfully requests that the Examiner reconsider and withdraw all presently outstanding rejections. It is believed that a full and complete response has been made to the outstanding Office Action, and as such, the present application is in condition for allowance. Thus, prompt and favorable consideration of this amendment is respectfully requested. If the

Examiner believes that personal communication will expedite prosecution of this application, the Examiner is invited to telephone the undersigned at (248) 641-1600.

Respectfully submitted,

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